Warm up.
Simplify.

$\sqrt{4a^2} = 2a$

$\sqrt{12a^2b^2}$ $2ab\sqrt{3}$

$\sqrt{8a^2}$ $2a\sqrt{2}$

$\sqrt{a^2+b^2}$

$\sqrt{a^2b^2} = ab$

$\sqrt{4(a^2+b^2)} = 2\sqrt{a^2+b^2}$

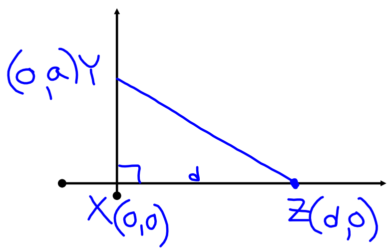
4-7 Triangles and Coordinate Proof

Tips

1. Use Origin as vertex or center
2. At least one side on x-axis
3. 1st Quadrant if possible
4. Use easiest coordinates possible

Example 1

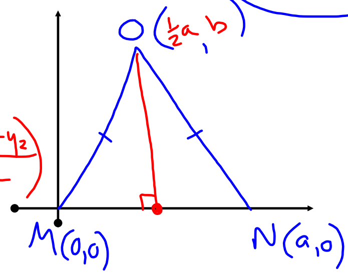
Right triangle XYZ with hypotenuse $\overline{YZ}$
XZ = d units long



Example 2

Isosceles triangle MNO with base $\overline{MN}$ a units long

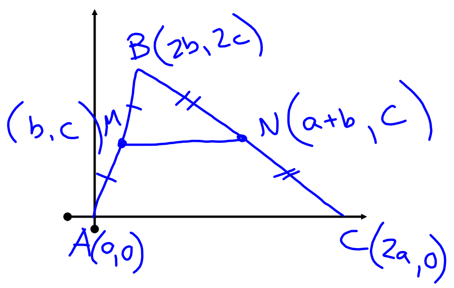
Midpt
$\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$



Example 3

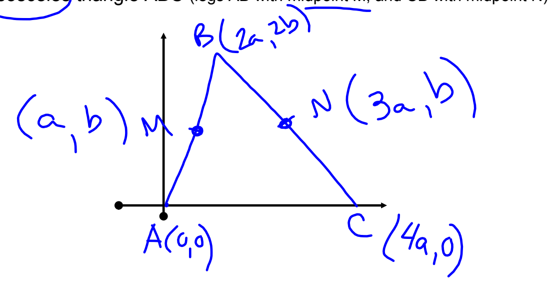
A line segment, $\overline{MN}$, joins the midpoints of 2 sides of $\triangle ABC$

(When using midpoint formula, then use even numbers.)



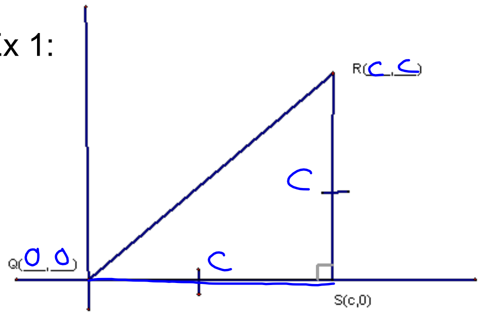
Example 4

Isosceles triangle ABC (legs $\overline{AB}$ with midpoint M, and $\overline{CB}$ with midpoint N)

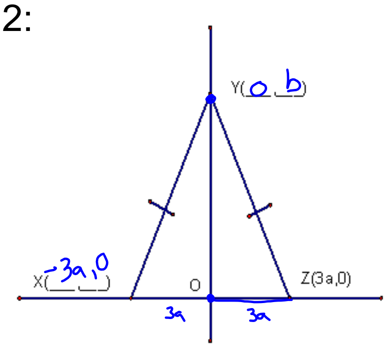


Fill in the missing coordinates.

Ex 1:



Ex 2:



Coordinate Proof

Distance Formula

$d = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

Slope

$m = \dfrac{y_2-y_1}{x_2-x_1}$ > lines // (same) or $\perp$ (opp. recip.)

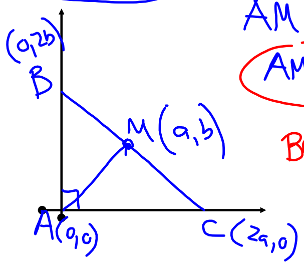
Midpoint Formula

$\left(\dfrac{x_1+x_2}{2}, \dfrac{y_1+y_2}{2}\right)$

When using midpoint formula, then use even numbers.

Example
Prove that the measure of the segment that joins the vertex of a right ∠ in a right Δ to midpoint of the hypotenuse = ½ the measure of the hypotenuse

Given: Right ΔABC with hypotenuse $\overline{BC}$. (M is the midpoint of $\overline{BC}$.)
Prove: AM = ½ BC



$AM = \sqrt{(a-0)^2+(b-0)^2}$

$AM = \sqrt{a^2+b^2}$

$BC = \sqrt{(2a-0)^2+(0-2b)^2}$

$= \sqrt{4a^2+4b^2}$

$= \sqrt{4(a^2+b^2)}$

$BC = 2\sqrt{a^2+b^2}$

$AM = \frac{1}{2}BC$

$\sqrt{a^2+b^2} = \frac{1}{2}\, 2\sqrt{a^2+b^2}$

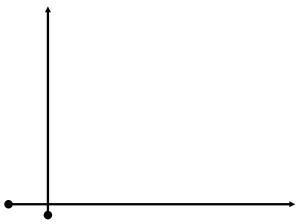
$\sqrt{a^2+b^2} = \sqrt{a^2+b^2}$ ✓

p. 225 #25

25. The segments joining the vertices to the midpoints of the legs of an isosceles triangle are congruent.

Given: Isosceles triangle ABC. (legs $\overline{AB}$ with midpoint M, and $\overline{CB}$ with midpoint N)

Prove: AN = CM



Homework
P 224-225
10-13, 16-24, 26-28(on paper handout)